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Report

Linnton Plywood Association Sampling and Analysis Plan

Prepared for

Linnton Plywood Association

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Prepared by

CH2MHILL

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SECTION 1

Introduction

1.1 Overview

This sampling and analysis plan (SAP) presents a description of sampling and analysis activities to be conducted at the Linnton Plywood Association (LPA) site in Portland, Oregon. The purpose of the SAP is to provide direction for field sampling activities under a Voluntary Cleanup Program agreement with the Oregon Department of Environmental Quality (DEQ). The SAP describes activities necessary for waste profiling and the sampling and analysis of groundwater and soil in previously identified areas of concern, or where earlier samples appeared to demonstrate the absence of significant sources or residual deposits of contamination.

This SAP includes some revisions to the Work Plan described in a letter from CH2M HILL to DEQ dated June 28, 2002. The revisions were discussed by DEQ and CH2M HILL on July 26, 2002, and were verbally approved. The current approach is described below.

This sampling effort is intended to provide data necessary to define whether the LPA site has the potential to be considered a source of contamination to the Portland Harbor. Representative samples of groundwater, samples from the former ash disposal area, samples from the knife grinding debris pile, samples from the Highway 30 catch basins, and samples from Outfall 6 will be used in conjunction with existing data from Outfall 5 and site catch basins to assess onsite environmental conditions. LPA intends to immediately remove knife grinding debris. Removal of soils around Outfall 5 and, potentially, Outfall 6, will be evaluated for interim remedial action. An overview of each area of concern, and its sampling and projected resolution, is presented below:

- Groundwater sampling: Resampling will occur in three areas where previous sampling showed apparent exceedances of DEQ screening level values. An additional groundwater sample will be taken in the former wigwam area.
- Samples will be taken from the former ash disposal area to document the nature and extent of this material.
- The knife-grinding pile will be sampled for profiling and will be removed as appropriate to the profile. If the material poses environmental concerns, verification samples will be collected following removal of the pile.
- Catch basins on Highway 30 will be composited and analyzed to document the nature of silts that may be transported to Outfall 6 from offsite origins.
- Material at Outfall 6 will be sampled for comparison with Highway 30 silts and sander ash materials. If Outfall 6 materials warrant removal, verification sampling will be conducted, using Highway 30 silts as a reference.

Explain use as a reference.

Haz. Waste determination?

- Outfall 5 material was characterized previously, and will be evaluated for removal in the near future. No additional sampling is necessary at this time. Verification samples will be collected following removal.
- Catch basins will be cleaned in the near future and subsequently sampled at a future date to document "current use" conditions via storm drains to the Willamette River.

The SAP provides a description of the specific procedures, activities, and protocols to meet waste profiling, soil and groundwater collection, and evaluation objectives.

1.2 Data Quality Objectives

Data and information collected during these sampling activities at LPA will be used to evaluate potential threats to the environmental from the LPA property. Sampling activities will be conducted to standard levels of quality assurance so that resulting data will be of sufficient quality and quantity to support the characterization of site-specific groundwater and soil conditions and waste profiling.

Samples of groundwater and soils (along with field and laboratory quality assurance samples) will be evaluated relative to data quality objectives and quality assurance/quality control (QA/QC) objectives. The overall QA objective for these samples is to provide analytical data of known quality to help meet objectives of precision, accuracy, completeness, representativeness, and comparability. Greater detail is provided in Section 4.

SECTION 2

Mobilization

2.1 Site Access and Setup

Sampling activities at LPA will begin shortly after DEQ approval of this SAP, which is anticipated to be in summer of 2002. Mobilization and setup activities will precede groundwater and soil sampling events. These activities will include:

- Locate utilities to identify and confirm the absence of underground utility lines in areas where soil sampling and potential excavations may occur.
- Obtain geotechnical boring start cards from the Oregon Water Resources Department (OWRD) (performed by drilling contractor).
- Test and calibrate all field equipment before each sampling event.
- Notify DEQ before sampling events. Notice will be provided to DEQ a minimum of 24 hours in advance of any field sampling, excavation, or removal work, although the goal of providing a 7-day notice should be routinely met.

2.2 Personnel and Safety Plan

The LPA site is an inactive plywood manufacturing operation. All site work will be conducted with the direct participation of a designated LPA safety officer.

A two-person team will conduct field sampling activities. Team members will be familiar with the sampling and handling procedures included in this document, and with health and safety procedures applicable to the work to be conducted (including state and federal regulations). A CH2M HILL Health and Safety Plan will be prepared before beginning field work, and a safety officer will be designated to ensure procedures are followed.

SECTION 3

Field Procedures

This section describes the field procedures to be followed during the collection of environmental samples from groundwater, soil, and waste media. These procedures cover the following:

- Collection of groundwater samples from direct-push temporary wells in the former wigwam area and in three areas where earlier unfiltered samples exceeded DEQ screening thresholds.
- Collection of subsurface soil samples to document the material located in the former ash disposal area and its approximate extent.
- Collection of profile samples at the knife-grinding debris pile.
- Collection of a composite sample of Highway 30 catch basin material to document upstream contributions to Outfall 6.
- Collection of soils from Outfall 6 to evaluate the need for removal and, if appropriate, to facilitate disposal of soils.

Clearly defined field sampling procedures are intended to ensure proper sample collection, handling, identification, preservation, and transportation to an analytical laboratory.

3.1 Groundwater Sampling

Groundwater samples will be collected from four direct-push temporary wells. One sample will be collected from the former wigwam burner area and one from each of three additional areas where earlier unfiltered samples exceeded DEQ screening thresholds (steam cleaner, maintenance shop, and Green End areas). See Figure 3-1. Samples will be analyzed for previously exceeded constituents (phthalates, copper, and lead). Table 3-1 presents the analytical parameters, methods, and estimated number of groundwater samples to be collected. Groundwater sampling will consist of the following tasks:

- Measure the depth to the static water level.
- Purge the wells sufficiently to obtain a representative sample.
- Measure field water quality parameters (pH, temperature, specific conductance, and redox potential).
- Collect water quality samples for laboratory analysis.

Specific groundwater purging and sampling procedures are presented in Section 5.

TABLE 3-1
Contaminant, Container, and Preservative Requirements

Sample Type/ Number	Location	Analyte	Analytical Test Method	Reporting Limit	DEQ SLV	Container Type	Preservative	Hold Time[b]
Groundwater								
4 temporary wells (1 per well, 1 duplicate)[a]	Wigwam, steam cleaner, maintenance shop, Green End	Phthalates	EPA 8270	10.0 µg/L	0.003 mg/L (Aquatic)	2 1-liter amber glass	Cool 4° C	7 days
		Copper	EPA 6010	10.0 µg/L	0.009 mg/L (Aquatic)	250-ml glass	HNO_3	6 months
		Lead	EPA 6010/7000	3.0 µg/L	0.0025 mg/L (Aquatic)	250-ml glass	HNO_3	6 months
Soil								
4 (1-2 per boring, 1 duplicate)	Former ash disposal area	NWTPH-Dx/O	EPA 8015M	20 mg/kg	No value	8-oz glass	Cool 4° C	14 days
		PAH	SW846 8270M	3.30 µg/kg	Varies by compound	8-oz glass	Cool 4° C	7 days
		Cadmium	EPA 6010	1.0 mg/kg	0.6 mg/kg	8-oz glass	Cool 4° C	6 months
		Chromium	EPA 6010	2.0 mg/kg	37 mg/kg	8-oz glass	Cool 4° C	6 months
		Lead	EPA 6010/7000	0.6 mg/kg	35 mg/kg	8-oz glass	Cool 4° C	6 months
		Copper	EPA 6010	2.0 mg/kg	36 mg/kg	8-oz glass	Cool 4° C	6 months
Waste								
1 (2 contingency TPH verification samples if removal necessary)	Knife-grinding debris pile	NWTPH-Dx/O	EPA 8015M	20 mg/kg	NA	8-oz glass	Cool 4° C	14 days
		PAH	SW846 8270M	3.30 µg/kg	NA	8-oz glass	Cool 4° C	7 days
		Volatiles	EPA 8260	1.0 µg/kg	NA	4-oz glass	Cool 4° C	14 days
		Cadmium	EPA 6010	1.0 mg/kg	NA	8-oz glass	Cool 4° C	6 months
		Chromium	EPA 6010	2.0 mg/kg	NA	8-oz glass	Cool 4° C	6 months
		Lead	EPA 6010/7000	0.6 mg/kg	NA	8-oz glass	Cool 4° C	6 months
		Copper	EPA 6010	2.0 mg/kg	NA	8-oz glass	Cool 4° C	6 months
Catch basins and Outfall								
1 (composite)	Hwy 30 catch basins and Outfall 6	NWTPH-Dx/O	EPA 8015M	20 mg/kg	No value	8-oz glass	Cool 4° C	14 days
		PAH	SW846 8270M	3.30 µg/kg	Varies by compound	8-oz glass	Cool 4° C	7 days
		Cadmium	EPA 6010	1.0 mg/kg	0.6 mg/kg	8-oz glass	Cool 4° C	6 months
		Chromium	EPA 6010	2.0 mg/kg	37 mg/kg	8-oz glass	Cool 4° C	6 months
		Lead	EPA 6010/7000	0.6 mg/kg	35 mg/kg	8-oz glass	Cool 4° C	6 months
		Copper	EPA 6010	2.0 mg/kg	36 mg/kg	8-oz glass	Cool 4° C	6 months

µg/L = micrograms per liter

mg/kg = milligrams per kilogram

NA – Not applicable (scheduled for removal)

SLV = ODEQ Level II screening levels (lowest applicable). Application of surface water and sediment SLVs to groundwater and upland materials is not, in the opinion of LPA, an appropriate use of these risk-based tools. It is provided here with the understanding that DEQ may choose to use the DEQ SLVs in this matter. LPA understands that revisions to sediment screening guidance are currently underway.

TBD = to be determined—will be conducted if soil removals are performed.

[a] Water samples will be field filtered with a 0.45 micron filter prior to introduction to sample containers.

[b] Holding time starts at the time of sample collection in the field.

3.2 Soil Sampling

A Geo-Probe® sampling device will be used to obtain subsurface soil samples. Six soil samples will be collected from four Geo-Probe cores to document the presence and concentration of metals and petroleum hydrocarbons in the former ash disposal area.

A composite sample from Outfall 6 will be collected. Field screening parameters (visual indicators and a PID) will be used to select confirmation areas and intervals for laboratory analysis. Procedures for collecting laboratory soil samples are described in Section 7.

Table 3-1 presents the analytical parameters, methods, and estimated number of soil samples to be collected during the sampling program. Figure 3-1 indicates soil sample locations. Specific soil sampling procedures are presented in Section 6.

3.3 Waste Profiling

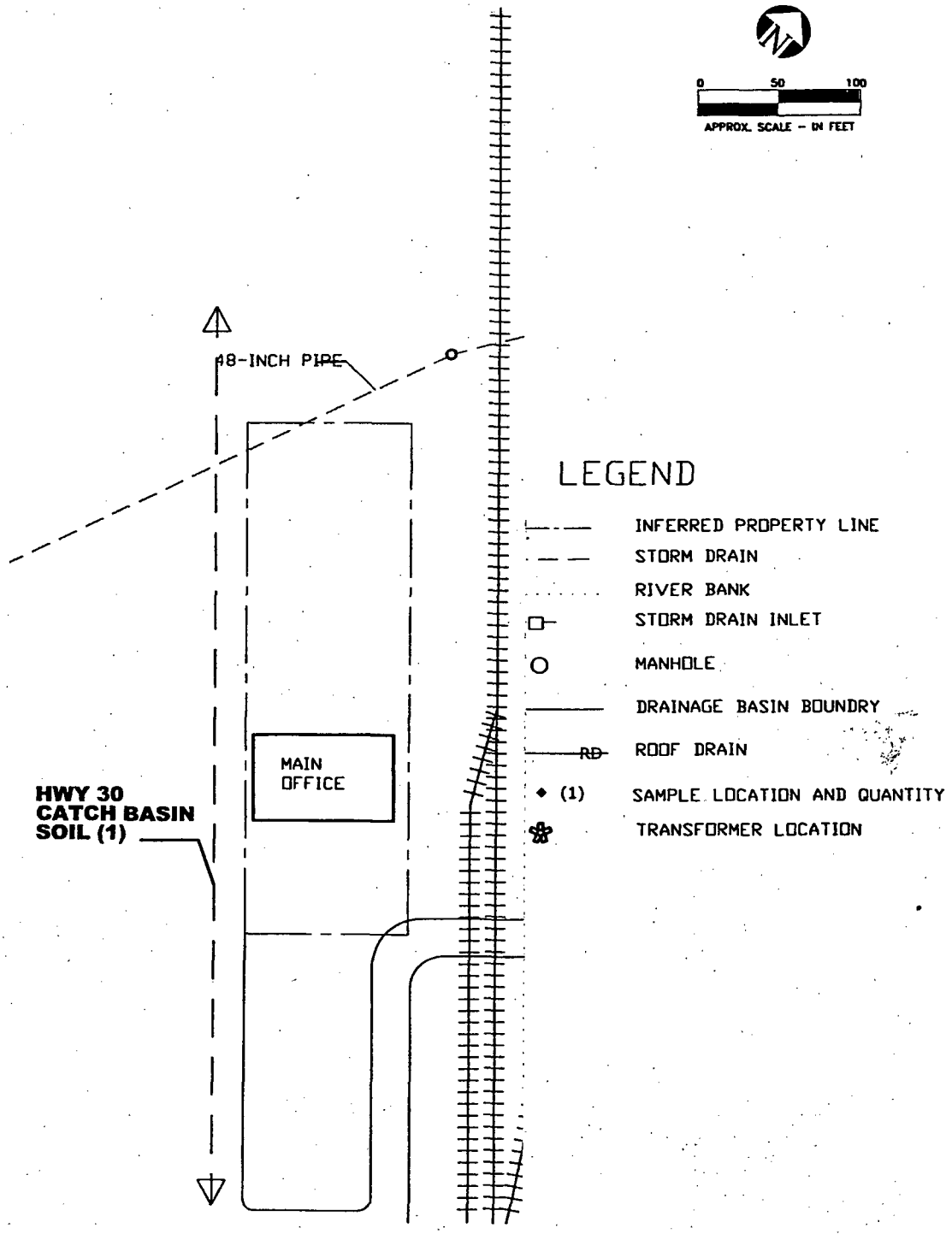
A single profiling sample will be collected at the knife-grinding debris pile. Two contingency post removal verification samples of PAH will be collected if necessary to document adequate removal of the waste.

3.4 Catch Basin Sampling

A composite sample of Highway 30 catch basin material to document upstream contributions to Outfall 6 will also be collected. Table 3-1 presents the analytical parameters methods and estimated number of catch basin samples to be collected during the sampling program. Figure 3-1 indicates waste sample locations.

Samples at each location will be collected as composite samples. A composite sample is collected by combining two or more discrete samples. Waste samples will be collected at the surface, middle, and bottom of the waste pile and at the corners and center of catch basins. Disposable steel spoons will be used to collect samples.

Composite samples reflect the general characteristics over an area or depth or over a period of time. Composite samples are collected by mixing equal portions of discrete samples. Composite sampling is a cost-effective way of determining the general characteristics of an area and is useful in evaluating characteristics for waste disposal.



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SECTION 4

Sampling Methods and Quality Assurance

The following is a discussion of the methods proposed for use in the collection and analysis of samples during sampling activities at LPA.

4.1 Field Quality Assurance/Quality Control

Field soil and water duplicates will be collected and submitted to the laboratory as part of the field QA/QC program. These QA samples are described in the following sections. Table 4-1 summarizes the frequency for QA duplicates and equipment blanks. Temperature blanks will be provided by the laboratory to verify samples remain at or below sample holding temperatures.

TABLE 4-1
Summary of Quality Assurance Sample Types and Percentage Frequencies

Sample Type	Percentage Frequency
Field Duplicate	10% for each parameter and media sampled or one per lab batch for each media
Equipment Blank	Not applicable (standard is 1 per 10 sampling locations where non-disposable equipment is used (i.e., peristaltic pump))

4.1.1 Groundwater Field Duplicates

A duplicate sample will be taken by filling an extra sample bottle at one selected well location. The duplicate will be assigned a different sample identification number than the original sample. The sample number will be such that it does not alert laboratory personnel that the sample is a duplicate. Both the original sample identification numbers and the duplicate sample identification number should be entered in the field notebook at the time they are collected.

4.1.2 Soil Field Duplicates

A duplicate sample will be taken by filling an extra sample jar at one selected soil boring location and one selected waste profile sample location. The duplicate will be assigned a different sample identification number than the original sample. The sample number will be such that it does not alert laboratory personnel that the sample is a duplicate. Both the original sample identification numbers and the duplicate sample identification number should be entered in the field notebook at the same time they are collected.

4.1.3 Equipment Blanks

The collection of equipment blanks is not applicable because there will be no need for decontamination of tubing or the peristaltic pump. Each well sampling procedure will use new tubing.

SECTION 5

Groundwater Sampling Procedures

This section describes the methodology for collecting groundwater samples at the points of potential concern as identified in this plan. Groundwater samples will be collected from soil borings using Geoprobe technology. Previous Geoprobe samples were collected at a depth of approximately 30 feet. For this sampling, the probe will be advanced to the approximate depth of the water table and retracted. A soil core sampler then will be advanced to verify the presence of saturated soils, thus confirming that the sampler is below the water table.

5.1 Groundwater Sample Collection

Groundwater samples will be collected by advancing a stainless steel sampling screen encased in an alloy steel sampler sheath. Once the desired sampling interval is reached, the sheath will be retracted approximately 44 inches while the screen is held in place, allowing groundwater to enter the cylinder through the screen.

5.2 Groundwater Elevation Measurements

Before sampling, the depth to groundwater will be measured. Water levels shall be measured using an electronic sounder.

5.3 Purging

The boring shall be properly purged before the groundwater sample is collected. Borings will be purged of at least three bore volumes before sampling. If the yield is too low to allow three bore volumes to be purged, the boring will be purged as much as possible and a sample will be collected after the well has recovered sufficiently for the sample to be collected.

5.4 Measurement of Field Water Quality Parameters

During purging, a disposable cup will be filled from the well after each well bore volume is purged. These samples will be measured immediately in the field for temperature, specific conductance, redox potential (Eh), and pH. Results will be documented in the field notebook. The probes used to take these measurements will be rinsed with distilled water before each measurement. Each probe will be field-calibrated or checked against standards in accordance with the manufacturer's specifications on a daily basis. Monitoring probes will not be placed in the sample containers to be used for laboratory analysis. After all laboratory samples are collected, a final field sample will be collected in a cup, and field parameters will be measured and documented in the field notebook.

5.5 Sample Collection

Bailers will be used to collect groundwater samples. The following procedures will be followed when collecting groundwater samples using a bailer:

- Sample wells using polyethylene, Teflon, or stainless steel bailer and nylon mono-filament line (a new line will be used at each well)
- Use single-sample pressurized bailers for collecting groundwater analyzed for metals. Secure the loose end ~~of the~~ line to an anchor so that the bailer is not accidentally lost down the well.
- Lower the precleaned bailer slowly until it contacts the water surface. Allow the bailer to sink and fill with the minimum of surface disturbance. Remove the first bailer and properly dispose of the water) so that the bailer can be rinsed with well water. Repeat as often as necessary to collect adequate sample volume.
- Attach the filter adapter and the hand pump to the bailer
- Pump the hand pump to filter the water in the bailer and allow slow discharge from the pump tube to flow gently down the side of the sample bottles with a minimum of entry turbulence.
- Use 250-ml glass jars to collect samples for metals analyses and 1-liter amber glass bottles to collect samples for phthalate analysis. Cap each bottle after it is filled.
- Groundwater sample containers will contain an acid preservative from the laboratory.

Clean nitrile or latex gloves will be worn during all sampling activities. Change gloves after sampling each well. Place all samples in an iced cooler after collection and deliver to the laboratory the same day. If samples are unable to be delivered to the laboratory the same day of sampling, seal and store the samples in CH2M HILL offices for immediate delivery the following day.

5.6 Management of Purge Water

The purge volumes typically will be less than 5 gallons at each well. Purge water collected during the sampling event will be placed in a 55-gallon drum and stored temporarily onsite pending disposal by LPA.

SECTION 6

Soil Sampling Procedures

Soil samples will be collected from soil borings using Geoprobe technology. The former ash disposal area will be sampled with 4 direct-push borings. Three 4-foot cores will be advanced sequentially to a total depth of 12 feet below ground surface (bgs) in each sample location, or to a depth below ash disposal area. One sample from the disposed ash layer will be collected from each boring. Additionally, a soil sample below the disposed ash layer will be collected at 2 of the 4 borings.

This section describes the methodology for collecting soil samples at the points of potential concern as identified in this plan.

6.1 Soil Sample Collection

Soil samples will be collected by advancing a stainless steel sampling probe into the undisturbed soil at the bottom of the borehole. The sampler will then be withdrawn from the borehole and the sample retrieved in a manner that minimizes aeration and subsequent loss of volatile organic compounds. Samples will be collected from the ash disposal layer, identified by visual delineation, and the soil layer beneath the ash disposal layer. The soil samples will first be proportionately removed from the desired interval and placed in the sample jar to avoid aeration.

A soil boring log will be prepared for each soil boring. The logs will contain information on the texture, structure, and composition of the soils. The relative proportions of gravel, sand, and silt/clay will be estimated and classified in accordance with the Unified Soil Classification System (USCS). Other information, such as sample depth, color, density, moisture content, recovery, and visual presence of organic matter and hazardous constituents, will also be noted. Photoionization detector (PID) or organic vapor monitor (OVM) readings within the sample interval will also be recorded, as described below.

If refusal is encountered prior to the planned depth of the borehole, a second location with relative proximity to the plan location will be advanced. Further refusal beyond two attempts will be addressed on a case-by-case basis in the field.

Soil samples will be collected in the deposition areas below Outfall 6 to evaluate the need for and potential benefit, if any, of focused soil removals in this area. These samples will be collected by hand from zones indicating the highest concentrations of contamination, if any, based on visual indications and field PID readings. Field screening samples will be collected in the outfall area, and samples collected where visual or PID readings indicate the potential for representative or elevated levels of contaminants.

6.2 Soil Sample Field Observation

Soil samples will be observed for evidence of soil contamination; such evidence could include staining, discoloration, sheen, or the presence of debris or other non-native material. Observations of note will be photographed and recorded in the boring log with the location and depth also noted.

Soil samples will be monitored in the field using a PID with at least a 10.2-electron-volt (eV) probe to screen all soil headspace samples. The headspace measurements will be performed as follows:

- Place the soil in a jar or Ziploc®-type plastic bag.
- Allow the headspace in the jar or bag to equilibrate for several minutes.
- Insert the PID probe into the jar or bag after equilibration to measure the presence of volatile organic compounds.
- Record the sample identification, time, and value in the field notebook.

The instrument will be calibrated at the beginning of each sampling day. After calibration, the background level will be measured, away from any probable organic vapor sources such as a vehicle exhaust pipe. An OVM may be used in place of the PID.

SECTION 7

Field Procedures

The following sections describe procedures to be followed during the collection of groundwater and soil samples. These general procedures address collection of samples in a manner representative of field conditions, as well as proper sample identification, preservation, and transportation procedures needed to retain sample integrity.

The following procedures apply to all soil and groundwater sampling:

- Decontaminate the equipment before and after use. To prevent cross-contamination of the samples, keep the equipment from contacting contaminated surfaces.
- Label filled sample containers with the project name, sample number, analysis to be performed, date and time of collection, and sample processor's initials.
- Place the labeled sample in a cooler maintained at temperatures not to exceed 4°C throughout the sampling and transportation period. All ice will be double-bagged in Ziploc® bags.
- Complete a chain-of-custody form, seal it in a bag, and tape the bag to the inside lid of the cooler. Seal the cooler with fiber-reinforced tape and hand-deliver it to the laboratory within 24 hours of sample collection. To retain sample custody, the samples will remain in sight of field personnel or in a locked location at all times until they are hand-delivered to the laboratory.

7.1 Sample Identification

Sample labels will be affixed to containers before sample collection. Labels will use the following system for designation:

yymm – MW-XX for groundwater samples

yymm – SB-XX-zz-zz for soil boring samples

yymm – CO-XX-zz-zz for outfall samples

yymm – WP-XX-zz for waste pile sample

where:

yymm—identifies the year and month the sample is collected (e.g., 0205 = May 2002).

XX—identifies the monitoring well, soil sample station number, or confirmation sample location (e.g., MW-1, SB-1, or CO-1). Locations must be documented in field log books. Confirmation measurements should be taken for all soil boring and soil confirmation samples.

zz-zz—identifies the depth interval of the sample (e.g., 5.5–7.0) in feet below ground surface

A fictitious identification number and sample time will be assigned to all field duplicate samples collected for groundwater and soil. The actual identity of field duplicate samples will be recorded in the field notebook.

7.1.1 Sample Field Documentation

Specific information and observations should be recorded in a field notebook during sampling. The most important information to be documented includes the following:

- Sampling team personnel
- Equipment model and calibration information for each meter used in the field (for temperature, DO, conductivity, pH measurements, or PID, etc.)
- Monitoring well purging data (including purge rate, total volume removed during evacuation, and water levels at the beginning and end of the purging process)
- Field parameters (temperature, pH, and specific conductance) collected during monitoring well purging or surface water measurements
- Management of purge water and soil sample residuals (i.e., collect in 55-gallon drums for temporary storage for subsequent disposal)
- Sample location relative to fixed reference points (i.e., monitoring well, track switch, etc.) Measurements should allow an accurate recreation of the sampling area for maps and should allow relocation to sampling points if necessary
- Sampling data including sample identification, types of bottles/jars filled and analyses to be performed on each sample, method of collection (peristaltic pump, split-spoon sampler, stainless steel trowel), odor and visual description of the water and soil samples, and date and time samples were collected
- Miscellaneous observations regarding well integrity, other nearby field activities, and equipment problems/troubleshooting measures

SECTION 8

Sample Handling

Specific procedures for sample packaging and shipping will be followed to assure sample quality and minimize breakage during transport to the laboratory. Table 3-1 summarizes sample containers, preservation, and holding times for each set of analyses.

8.1 Sample Preservation

Some sample types require preservation to retard precipitation, biological action, hydrolysis, and reduce sorption effects. Preservation methods generally consist of pH control through chemical addition (e.g., HCl, HNO_3, etc.), refrigeration (chill to 4°C), and protection from light (for example, use amber glass bottles).

Samples will be placed in an insulated cooler containing ice immediately after collection and held under chain-of-custody until samples are ready for packaging and shipment. When a chemical preservative is needed for selected parameters, the laboratory will provide bottles with appropriate preservatives already added. Bottles prepared with preservatives will be pre-labeled and identified as "preserved" to distinguish them from non-preserved bottles.

8.2 Sample Custody

Field personnel will maintain custody records for all samples collected as part of the field sampling. A chain-of-custody record will be completed for each shipping container and the information will be consistent with the sample identification matrix.

The following information is to be included in the chain-of-custody form:

- Sample number
- Signature of sampler
- Date and time of collection
- Place of collection
- Type of sample
- Sample identification number
- Type of container
- Inclusive dates of possession
- Signature of receiver

A sample chain-of-custody form is provided in the Appendix. In addition to the labels, seals, and chain-of-custody form, other components of sample tracking include the field notebook and sample shipment receipt.

8.3 Sample Packaging

Samples to be shipped to the laboratory for analyses will be handled and packaged appropriately to maintain complete chain-of-custody records and to prevent damage during shipment. Coolers, provided by the laboratory, will be used for shipping sample containers. Bubble wrap will be used to pack and cushion the sample containers in the cooler. The chain-of-custody form will be placed in a plastic bag and attached to inside of the cooler lid. Chain-of-custody seals will be attached at both the front and back of container. The name and address of the receiving laboratory will be placed in a position clearly visible on the outside of the cooler, and the lid will be secured with strapping tape.

8.4 Sample Shipment

Samples will be shipped in accordance with U.S. Department of Transportation-approved procedures for hazardous substances. Samples will be hand delivered to the laboratory for analysis.

SECTION 9

Calibration of Field Equipment

The following field equipment will be used to support the groundwater and soil sampling programs:

- Electronic water-level sounder
- YSI-30 meter with temperature and specific conductance readings or equivalent
- Orion 250A meter with an Orion pH probe
- OVM 580 PID or OVM, specs

Calibration will be performed before each sampling event per the manufacturer's specifications. Recalibration will be performed, as needed, if inconsistent readings are obtained. Table 9-1 summarizes quality control specifications associated with field measurements and shows control parameters to be assessed, control limits, and corrective actions to be implemented.

TABLE 9-1
Field Quality Control Specifications

Analysis	Control Parameter	Control Limit	Corrective Action
pH Orion Probe	Continuing calibration check of pH 7.0 buffer	PH = 7.0± 0.1	Recalibrate. If unable to calibrate, replace probe
Temperature YSI-30	Standard mercury thermometer	± 5%	Replace thermocouple
Electrical Conductance YSI-30	Continuing calibration check of standard solution	±1% of standard	Recalibrate.
Photo Ionization Detector (PID)			
Volatile Compounds OVM 580 PID	PID is calibrated with zero and span gas at the beginning of each sampling day.		

SECTION 10

Disposal of Investigation-Derived Waste

Residual soil cores generated during soil boring activities will be placed in a steel drum. The quantity of soils generated from these drilled boreholes is expected to be minimal due to the limited amount of borings and the overall shallow depth of these borings. Soils are expected to exhibit nominal levels of TPH contamination, if any. Soils will be stored temporarily in a 55-gallon drum until a determination is made regarding soil excavation. The drum will be labeled, dated, and stored onsite awaiting disposal by the property owner. Contaminated soils may be included with excavated soils going for offsite treatment.

Purge water will be temporarily stored in a 55-gallon drum. The drum will be labeled, dated, and stored onsite awaiting disposal by the property owner. The groundwater sample analysis results will be used to aid in the characterization of the purge water for disposal by the property owner.

APPENDIX

Sampling Field Data Sheets

CH2M HILL WELL SAMPLING FIELD LOG

Site: _____

Date: _____

Project #: **Field Team:** **Well I.D.:**

Total Depth: (ft)	(-) DTW: (ft)	Time (=)	(X) 0.17 0.65 gal/ft	= Well Casing Volume:
Field Conditions:				
Decontamination: Alconox + tap wash; Tap rinse; DI rinse				

PURGE INFORMATION

	Purge Method: Transient 2" Grundfos pump with | |new | |dedicated 1/4" polyethylene (LDPE) tubing					
	Purge Method Peristaltic pump with | |new | |dedicated LDPE tubing & | |new | |dedicated C-flex head tubing					
	Refer to Calibration Log Sheet for this date					
Type of Flow Through Cell:		1-gallon poly jug	✓	10 oz cup		Grab sample
Pump Suction depth (ft):						
Comments/Exceptions to SAP:						

Time	Purge Volume (gal)	*EC or *SC (uS/cm)	Temp. (oC)	Ph	ORP (mV)	D.O. mg/L	Turbidity (NTU's)	Purge Rate (gpm)	DTW (ft)	Pump Speed/**Clarity/ Color/Remarks
:	Pump On								Initial	
:										
:										
:										
:										
:										
:										
:	Start Sampling									
:	End Sampling									
:										

* EC = Electrical Conductivity and SC = Specific Conductance at 25 degrees Celsius. Circle method.

** VC=Very cloudy Cl=Cloudy SC=Slighlty Cloudy VSC=Very Slighlty Cloudy AC=Almost Clear C=Clear CC=Crystal Clear

Laboratory Analytical Program

Site:_____

Date: / /

Circle Number of Sample Containers								
Sample I.D./Time	MS/MSD	Number of sample containers	Volume of each container	Bottle Type	Preservative	Shipping Date	Field Filtered	Analytical Method
Sample I.D./Time							Y N	
							Y N	
							Y N	
							Y N	
							Y N	
							Y N	
							Y N	
Duplicate I.D./Time								All the above
Field Blank I.D./Time								All the above
Equipment Blank I.D./Time								All the above

Shipping Method: Hand - Courier - Fed Ex - UPS - Bus **Laboratory:**

Comments/Exceptions to SAP:

CH2M HILL Instrument Calibration Log

Site: _____ Date: _____

Calibrated By: _____ Log Sheet 1 of _____

	Meter Type	Manufacturer	Model Number	Mnfg. Serial#	CH2M HILL ID#	Rental Co. Serial#	Time
1a	**pH**						
1b	pH Electrode						
	Calibrated: _____ to 4.00 buffer _____ to 7.00 buffer _____ to 10.00 buffer at _____ °C						
	Slope =_____ Comments:						
2	**Conductivity**						
	Specific Conductance: Calibrated _____ µS/cm to _____ uS/cm calibration standard						
	Electrical Conductivity: Calibrated _____ µS/cm to _____ µS/cm calibration standard at _____ °C						
	Comments:						
3	**Temperature**						
4a	**ORP Meter**						
4b	ORP Electrode						
	Electrode Filling Solution = Orion 900001						
	Use Orion 900001 electrode filling solution for dilute solutions that have a total ionic strength of <0.2 M.						
	Using 900001 fill solution, the electrode will match the potential of a conventional calomel electrode.						
	Electrode measured _____ millivolts at _____ °C in Zobell prepared on / /						
	Table value for Zobell solution at this temperature is _____ mV.						
	Electrode measured _____ millivolts at _____ °C in Orion 900001 solution.						
	Table value for 900001 fill solution at this temperature is _____ mV.						
5	**Turbidity**						
	Calibrated turbidimeter to 0.02 NTUs reference standard. Comments:						
6a	**DO Meter**						
	Air-Calibration: Measured temperature _____ °C corresponds to _____ mg/L DO (from Table I)						
	Atmospheric pressure / elevation correction factor _____ (from Table II)						
	Corrected calibration value _____ mg/L DO (Table I value times Table II value)						
	Comments:						
7a	**Fluoride**						
7b	Fluoride Electrode						
	Electrode Filling Solution = Orion 900001						
	Calibrated to 1.0 ppm; 10.0 ppm;and 100 ppm fluoride standards. Slope = _____ @ _____ °C						
	Comments:						